tank, filling three intermediate tanks, viz., those of Pooleankadewatta, Addikore, and Permamadua.

Kandelly tank is small compared with what it originally was. The inside of the principal mound is about a mile and a half long. The stones are simply laid in layers, one over the other, giving it the appearance of a flight of steps in a line perfectly straight—there is not the least appearance of masonry or mechanical art in the formation of this mound (except the sluices). The stones are about the size that two men would carry, taken from the neighbouring hills, which are of themselves piles of loose stones. Kandelly tank rises during the rains from its lowest state ten or twelve feet at the mound, and issues through two sluices running to Tamblegam lake. The country about Tamblegam can be completely inundated by water from this tank, though there may not have been a shower of rain for several weeks, thus showing the great importance of such reservoirs. A canal enters Kandelly tank from Kowdellah, and the wannyar of Minnery confidently asserts, that canoes and boats formerly went between Kandelly and Ellaharah in that direction, and that it was the general opinion that these tanks were formerly kept full with water from the Ambanganga, a communication which could again be opened with little expense, as masonry would not be required.

These large tanks, numerous small ones, with ruins of fallen wharfs, remains of deserted villages, and other remnants of antiquity, prove that the vast wilderness of beautiful and valuable forest trees, through which which the new line of road passes, heretofore supposed a trackless desert, obnoxious to the existence of man, and destitute of water and inhabitants, once contained a considerable population, by whose labours an extensive tract of irrigated lands was regularly cultivated.

III.—*Reports on the Navigation of the Euphrates.—By Captain Chesney, R.A.* By George Long, Esq.

WHILE new parts of the world are daily becoming better known through European enterprise, many most interesting portions of the ancient world seem likely to be forgotten or neglected, though, both for their physical character and the historical recollections attached to them, they furnish materials as ample for the inquirer into natural phenomena, and infinitely more abundant for him who studies the history of man, and the revolutions of political societies.

The object of Captain Chesney's memoir is to show the practicability of a communication with India by means of the Euphrates. With this view he has minutely examined the river between Anna

and Babylon, and for the rest of the course between Bir and Bussora has collected information for the purpose of enabling those interested to judge of the propriety of establishing this line of communication. Our object is merely to select those facts from the report, which may help to give a more correct idea of this noble river below Bir, and to compare the description of Captain Chesney occasionally with the voyage of Rauwolf* down the Euphrates, with Niebuhr, the Itinerary of Isidore of Charax, &c. The point on the Euphrates which Captain Chesney proposes as the station of the steam-boats is Bir, on the left bank of that river. The position of this town has been already well known from the description of previous travellers; it is fixed at about 36° 59′ N. lat., 38° 7′ E. long. From Bir to Bussora, following the windings of the river, the distance is calculated by Captain Chesney at 1143 miles—

	Miles.
From Bir to Anna, calculated on the descent of boats .	313⅖
From Anna to Hilla (per maps 2, 3, 4)	440
From Hilla to Bussorah, by detailed calculations . .	389⅗
	1143

Bir, which lies on the road between Aleppo, Orfa, and Diarbekr, contains from eighteen hundred to two thousand houses, and is three and a half days from Aleppo by caravan. The inhabitants are Turks, who also extend five or six hours down the stream, and are described as a peaceable people. The country about Bir furnishes abundance of provisions; Rauwolf says that, in his time, the hills near Bir supplied many goats and sheep for the consumption of Aleppo. The Arab tribes commence about fourteen hours from Bir, where there are some ruins called Bilha on the left bank. About eight hours below Bir, on the right bank, are the ruins of Salamia.

The banks of the Euphrates are in parts still well peopled, though the population is far less than it would be if agriculture could be more generally diffused and security of property established. Independent of what we know from historical records of the numerous towns that lined the banks of the Euphrates, the existing remains attest the same fact. As the interest attached to the Euphrates is peculiarly one of an historical character, we shall notice all the ancient sites that Captain Chesney has mentioned in his memoir. At twenty-eight hours below Bir, and a little distance from the left bank, is Seluk, a ruin; and opposite, on the right

* Leonharti Rauwolfen der Artznei Doctorn, &c. Aigentliche Beschreibung der Raisse. 1582, 1583. There is a translation of Rauwolf in "A Collection of Curious Travels, &c." by John Ray. London, 1693. The translation is not by Ray; sometimes it is slightly inaccurate.

bank, the ruins of Auz. The Beni Said Arabs extend from Seluk to Giabar. Thirty-five hours below Bir, on the left bank, is the castle of Giabar, (the Iabar of Rauwolf,) and a town of about a thousand houses and tents. There is an abundant source of bitumen near Giabar. These are the first houses observed between Bir and this place. The river from Bir to Giabar is rather sluggish, running over a sandy or pebbly bed.

Rauwolf's voyage (commenced August 30, A.D. 1574) does not enable us to estimate the distance from Bir to Giabar, as no hours are given, and owing to running aground on a sand-bank he lost several days. After leaving Bir, he remarked, a short distance below that town, the commencement of the desert on the west side; farther on, both sides of the river were lined with brushwood, in which wild animals, and particularly wild boars, were both heard and seen. The Arabs were very troublesome. For two days nothing but desert on both sides, with a great deal of low wood, plenty of wild boars, and Arab huts full of children. Rauwolf's voyage from Bir to Giabar in a loaded boat (in September) fully confirms Captain Chesney's opinion (note, p. 8) of there being no serious obstruction between these two places. The general course of the Euphrates from Bir to a place called Cala (castle) by Rauwolf is south, but very tortuous. Cala he places two days journey from Aleppo, which, as Major Rennell remarks, must be long ones. Giabar is placed by Captain Chesney from three and a half to four and a half days from Aleppo by caravan, and only two days for a horseman. From about Cala we conjecture that the eastern bend commences, and the river here makes a great elbow. With such data as we possess, an accurate delineation of its course is impossible, but this great elbow, which some have doubted about, certainly exists. The castle of Giabar is ascribed by Captain Chesney to Alexander the Great, but this is a mistake; Rauwolf compares its towers, which then existed, to those of Aleppo.

A little above and also below Giabar, Captain Chesney states that the Arabs have a bad character, which it seems they had in Rauwolf's time, who adds, it is no wonder they were so troublesome, for they had nothing to eat; he describes some of them as coal-black, and as naked as they were born. They were unacquainted with fire-arms, but no doubt they are possessed of them now, and may be found a little more dangerous visiters to the voyager than they were two centuries and a half ago. It appears, indeed, from a comparison of Rauwolf's narrative with Captain Chesney's, that the obstacles to the navigation of this river from the inhabitants are greater now than they were in 1574.

From Giabar to Racca is eight hours. Racca, the Nicephorium of Isidore, has only about thirty houses; it stands on the left bank near the junction of the Belich, or Belejich, with the

Euphrates. This little river has retained its ancient name of Bilecha. The Itinerary of Isidore commences at Zeumag (near Bir) on the Euphrates, and runs in a tolerably direct line to Nicephorium, avoiding the great bend of the river.

"Below the Belejick, and a little more than *two* hours from Giabar, the first obstruction below Bir is met with." (Captain Chesney, p. 8.) There is some mistake here; Racca, at the mouth of the Belejick, is *eight* hours below Giabar.* Between the mouth of the Belich and the island of Der (supposed to be the ancient Thapsacus) there are several obstructions in the river, and also several camels' fords: islands in the river, often covered with wood, are common both above and below Der. None of the fords appear to have less than three feet water in the dry season. Opposite Der, on the right bank, is the town, which contains about fifteen hundred houses. *One* hour below Der, which is on the right bank, is a camel's ford with four feet water. Supposing Der to be the Thapsacus of Xenophon, where the army of the younger Cyrus crossed, it is possible that the depth of water may be generally more than four feet. When the Greek army passed in the dry season, it was not more than breast deep, which however was considered by the natives as an uncommon occurrence. Der is eight days caravan journey from Aleppo; it was eight days march for the army of Cyrus from the Chalus (the river of Haleb or Aleppo) to Thapsacus. Three days below Der is the rocky passage of Is Geria, (about 35° N. lat. below the junction of the Khabour,) where Captain Chesney's personal observations commence; his information on the points above Is Geria being mainly derived from a native boatman of Anna. At this place a ledge of rocks, extending a hundred and fifty yards along the river, crosses its entire bed, with the exception of a passage sixteen or seventeen feet wide, where there is from two to two and a half feet water at the dry season. Numerous other ledges of rocks are found as far as Anna; and, indeed, in all the distance between Racca and Anna (about a hundred and seventy miles) the bed of the Euphrates is very rocky. The least depth over the rocks is two feet, or twenty-two inches; the ordinary depth of the river, where there are no rocks and shoals, is from six to nine feet.

At Racca, Rauwolf describes the old town, which was on the heights, as exhibiting a wall, arches, and pillars. Greek remains might possibly still be found here. Below Racca he describes the country as a desert for several days; the deserts were succeeded by high bare hills without a stick upon them. On the fourth day from Racca the mountains ended, and Rauwolf observed here a

* We cannot reconcile Captain Chesney's map and his description in this instance, nor do we understand the description of the river between Giabar and Der.

strong fort of a triangular form called Seleby, built on a hill, with two walls running down to the right bank of the river. Six miles lower another fort of the same name appeared on a very high bank. A little above Der he describes the river as dividing into several branches; Rauwolf, who was a botanist, noted a willow tree in this neighbourhood of a peculiar character, called in Arabic *garab*. The country about Der is tolerably fertile, and produces plenty of corn, millet, cotton, &c. The islands produce garden vegetables, such as cucumbers, melons, cauliflowers; the date, the lemon, and the citron also grow there. Captain Chesney, on the authority of his informant, marks it as a place where supplies of meat, rice, eggs, &c. could be procured; and he adds, "It would also be a safe halting place." Rauwolf's character of the people is favourable. He found the water at Der low in October, and full of mud. The fertile character of the country about Der tends to confirm the opinion of its being an ancient ford, on a line of route, and probably the ancient Thapsacus. The Chabour, which Rauwolf calls the Chabu, joins the Euphrates below Der, and above the town of Rachaby, the Rahabat of Captain Chesney, who places it three hours below Der, and in his map above the junction of the Chabour. If we may trust Rauwolf, Captain Chesney's information here is not correct*. Rachaby (the town) lies on the right bank, about two miles from the river, in a fruitful plain. From Der to Schara, where Rauwolf paid the usual customs, was three days sail; about Schara (October 7) there were many bushes; but here began that formidable desert which the army of Cyrus passed through, and the Greek so faithfully describes. The picture given of it by Rauwolf is no less striking, and is a good specimen of his rough old German—"Von Schara gieng unser fart etliche mehr tag nach einander wol uund glücklich fort, aber maistthails durch sandechte wüstinen auss, die so gross als wir je zuvor gehabt haben: wie sich dann die zü zeiten so weit erstreckten das wir kein ende daran möchten ersehen: welliche auch so dürr waren, das darinnen nicht bald weder äcker noch wisen, stöck noch stauden, laub noch gras, weg noch steg, zuersehen noch zufinden. Desshalben dann dise wol mögen für die wüstinen gehalten werden, welliche man gemainlich das sandig Möhr genennet."

In this wilderness, Rauwolf saw nothing remarkable but some ancient turrets on the high banks, at a point called Ersy, "where, as some say, hath been formerly a famous town." And here, he says, (p. 188) "the river takes so great a sweep, with numerous windings, that we were more than half a day getting through them." The resemblance of name between the Ersy of Rauwolf

* There are difficulties about Rahabat. See Rennell on the Comparative Geography of Western Asia, i., p. 42, &c.

and the Corsote of Xenophon would lead us to consider them as the same place. Corsote, it is true, is placed by Xenophon on the Mascas (the Saocoras of Ptolemy), which enters the Euphrates on the east bank; and "Corsote (Xenophon, Anab., i., 5) was surrounded by the Mascas." The narrative of the Greek historian leads us to suppose, that Corsote was near the junction of the two rivers. But neither Rauwolf nor Captain Chesney mentions this small affluent of the Frat. The difficulty of identifying ancient and modern positions on the Euphrates is very great, for the land route did not follow the river as many suppose, but stretched across from one elbow to another, contriving to hit the fertile spots that are occasionally found near the river. Any attempt at fixing positions from the parasangs of Xenophon, the schæni of Isidore, and the latitudes and longitudes of Ptolemy, will be fallacious.

Rauwolf speaks of the frost and dew (10th and 11th October), just before reaching Annah, as being considerable. We have purposely made our extracts from this excellent old traveller somewhat longer, as far as this point, because Captain Chesney's own personal observations commence at no very great distance above Annah. This town is on the right bank, at a bend of the river to the N. E., with a string of cultivated islands opposite to it. The place is pretty well known from the accounts of former visiters. Captain Chesney states the number of houses at about eighteen hundred. It consists of one long, narrow, winding street, running along the contracted space between the high grounds and the river; and contains two mosques. The high, bare hills rise abruptly from the left bank, along which is the boat's passage as far as the principal island, opposite which the town terminates. This island is the Anatho of Isidore; and is covered with ruins, which also extend eastward for two miles farther along the left bank. "The chief objects of interest," Captain Chesney remarks, "are the remains of four ancient castles, one of them on the great island; also a beautiful arabesque minaret, about eighty feet high."

Annah is a place that can afford sufficient supplies (Captain Chesney). Rauwolf, who seems to have had a better opportunity of examining the soil and productions in the neighbourhood of this place than any subsequent traveller, enumerates, among its productions, the olive, orange, citron, lemon, pomegranate, and the date, of which he saw two new sorts, quite red and yellow. Cotton and corn were growing: he says, the corn was just ready to cut (Oct. 12); which for the latitude of Annah appears rather late*.

"Seven or eight miles below Annah, at the turning of the river, the site of the ancient Tilbus opens to view" (Captain Chesney). There is no ancient Tilbus; but Captain Chesney probably alludes

* Captain Chesney (p. 5) places the harvest in May. Possibly there may be two harvests in the year.

to the island Olabus of Isidore, where was the "treasury of the Parthians." But the distance of twelve schœni (perhaps about twelve farsangs) from Annah will not agree; besides, Captain Chesney does not give the modern name, unless we are to understand that Tilbus is the modern name also. The place may possibly correspond to the Thilutha of Ammianus (lib. xxiv., cap. 2). Below Annah, we find Hadisa or Haditha (about 34° 10′ N. lat.), which retains its ancient name, and exhibits an "ancient stone wall, still in a good state, serving as a rampart, flanked by semicircular towers, and joining the extremities of the old castle, which stands at the western extremity of the island; with the remains, near it, of a stone bridge, which once communicated from the left bank to the right, through the island and town." The hills here rise from both banks of the river. Below Haditha, the bed of the river is rocky; and the rapids of Hudder el Elias have, near their extremity, a fall of two feet in fifty or seventy. A short distance below the rapids is the island of El Oos; about a mile long, with five hundred houses covering all the island, and two mosques. The margin of the island is faced with an ancient stone wall, showing that it is an old town, and it might be Olabus, except that the distance of Isidore, as given between Annah and Hit, two well-known positions, are entirely at variance with this supposition*. The Ozo-Gardana of Ammianus bears sufficient resemblance in name to El Oos, but we do not venture to reckon the distances of Ammianus. "The hills opposite the town, on both banks, run to a considerable height, brown and bare, but very bold in the outline." Sixteen miles below El Oos, the Wady Haran, the bed of a wintery torrent, enters the river on the right bank; and three miles lower is the picturesque island of Jibba, more than two miles long; its town contains five hundred houses, some mills, and aqueducts, with numerous date gardens interspersed; the whole backed by a bold outline of irregular hills on both sides, but especially on the left bank. Jibba can furnish dates, meat, rice, &c. (Captain Chesney): of fruits, Rauwolf mentions the date, almond, and fig. About five miles below Jibba, "a ledge of rocks, about ten feet wide, crosses the river, leaving a passage in the centre of fifteen feet wide, and ten or eleven in extent, with three and four feet of water:" this is the last impediment which the boatmen of the river consider of any importance. Near Gasar Sadi, a short distance before we come to Hit, "one of the ancient parapet walls causes a fall of nearly one foot, when the river is low; but there is a depth of six and a half feet in the centre." In this neighbourhood, on the left bank, there is "quite a river of bitumen." Before arriving at Hit, there

* El Oos is the Eluce of Rennell's map, and he makes it the representative of Olabus. He makes Ozogardana identical with Is or Hit.

are two more falls, one of only a few inches. Hit, the Is of Herodotus and the Aeipolis of Isidore, is easily identified; it is generally placed about 33° 43′ N. lat., 42° 27′ E. long. The sources of bitumen here seem as permanent as a source of water, for we know that they produced this substance in great abundance at the time when old Babylon was built. "Hit contains about fifteen hundred houses, built all around an elongated hill, rising from and parallel to the right bank of the river. The houses are chiefly of clay, one or two stories high, flat-roofed, and many of them covered or repaired on top with bitumen; the streets are narrow, dirty, and frequently steep, rising one above the other along the side of the hill; with a dusty, black appearance, owing to the smoke from the constantly boiling bitumen. The hill and town are inclosed by a high mud wall, with semicircular towers, but no ditch. One graceful minaret appears amidst this mass of brown clay; and some respectable specimens of arabesque architecture are displayed in some of the saints' tombs a little way outside the town, where the scenery is that of brown, barren hills, and a desert country. Little or no grain is cultivated near Hit; the inhabitants prepare a good deal of wool, but their chief occupation is in boat-building, burning lime, making salt, and preparing bitumen, nafti, &c.; great quantities of each being sent to Hilla, Bagdad, Bussora, and other places; the nafti finding its way even to India."

Ten miles below Hit, there is a source of naphtha at Nefata, on the left bank. Here the hills cease nearly altogether; the bed of the river is sandy or muddy, the stream more sluggish; and the irrigation, instead of being effected by aqueducts, as in the rocky portion of the river, is managed by bullock-mills.

It appears that the Euphrates is lined on each side by hills for some distance above Annah and a little below Hit; and the bed of the river is rocky from below Racca to Annah, and indeed somewhat lower. We know nothing of the absolute elevation of the high land on each side of the Euphrates; but we conjecture that the descent from the hills, on the east side into the desert, is comparatively small, and that a large part of the upper Jezirah is a flat, with some moderate elevation above the river. Hills line the left bank of the Tigris, also, above Tekrit towards Mosul. We have the authority of Xenophon, if any is wanted, for the country south of the Khabour being as flat as the sea; the army, even after crossing the Mascas (the Wady al Seba), was still in the desert, and their route was occasionally over uneven ground, being near the Euphrates. Xenophon says, that the inhabitants in some places cut mill-stones near the river, which they carried down to Babylon. The town Charmande (Anab. i., 5, 10) is only so far fixed by Xenophon, that we know it to have been on the west

bank, and within the ninety marches through the desert country. In Captain Chesney's map, there is marked between Annah and Hit, and nearer the latter, "Girband Rocks and Island." Girband and Charmande are, in fact, the same name; and as the islands in the river are generally fertile, the town of Xenophon, to which the soldiers crossed on their tent-skins stuffed with dry grass, may possibly be represented by the island of Girband. The hills that line the river, we conjecture to be calcareous: the rocks in the river must generally be the edges of the strata. Tavernier mentions chalk near Annah, and Captain Chesney speaks of marble quarries in the mountains.

Though Babylon was built of brick, considerable quantities of stone were also employed for various purposes; and there can be no doubt that a minute examination of this hilly region would bring to light the old Babylonian quarries, probably a little above Hit.

Above Hit Captain Chesney found numerous remains of ancient aqueducts for irrigating the country, some of which are still used both for that purpose and for grinding corn. These aqueducts, as he describes them, are of stone, well cemented, and narrowed to two feet or twenty inches at top. They run into the stream at right angles, and rest on pointed arches; when it was required to convey them far inland (some run as much as one thousand two hundred yards) a double series of arches was used, resting one on the other; the stone-work between the upper arches rests on the key-stones of the lower arches; the arches, after running some little distance into the river, take a turn parallel to the stream; at the end of this turn, water-wheels are placed, about thirty-three feet in diameter. On the exterior circumference of the wheels earthen vessels, three or four inches in diameter and twenty inches long, are fixed at intervals of eighteen inches, with their mouths of course in the direction of the stream. The earthen vessels are generally found to offer resistance enough to the current to turn the wheels, but in some cases six or eight fans of palm branches are fixed to the sides of the circumference. The wheels are moveable, and can be raised so as to work equally well at various heights of the river. Captain Chesney observed that there are generally above each aqueduct the remains of a *bund*, or stone rampart, carried across the river, with the exception of an opening left for boats. These bunds are now frequently nothing "but a bank of stones disturbing the evenness of the current, but always affording a sufficient passage for large boats at low seasons." The object of them was simply to create a head of water. Rauwolf's description is worth quoting. Speaking of the navigation below Annah, he says,—

"But our master was very much troubled because the river was often stopped up at the sides with great stones that made the river

swell, for there was a great number of large and high water-engines or wheels, and these stones were said to lead the stream to them, to make them work, for it often happened that two of them stood close together, which took up so much of the river that we had hardly room to pass by them in the middle of the stream, wherefore he was forced to have great care, to find the right way where he might pass without danger. The reason why these water-wheels are so much in use is, because this river doth not overflow (as the river Nilus) to water the grounds, neither doth it rain enough here sufficiently to moisten the seeds and garden plants, that they may not be burnt by the great heat of the sun, wherefore they must look out for such means as will supply this want. To do this they erect water-wheels (whereof three or four stand behind one another) in the river, which go night and day, and dip up water out of the river, which is emptied into peculiar channels, that are prepared on purpose, to water all the ground. But if the places lie not conveniently, or the shore be too high to erect such wheels, they make instead of them bridges and peculiar engines, that are turned by a couple of bullocks, to bring the water up, with great leathern buckets, which are wide at top and narrow at bottom."—(p. 170. English translation.)

From a few miles below Hit to Hillah, near the site of Babylon, the country is generally flat; the bed of the river is sand or mud, the current deeper and slower; the banks of the river have few trees and little brushwood, and are generally either perpendicular or rise in steps. Numerous Bedouin tents, made of goat's hair mixed with wool, are seen along the river, and flocks of goats, sheep, and cattle feeding near them, and "beautiful mares clothed and piqueted close to the tents, their masters strolling about armed." The water for irrigation is here raised by bullocks, who traverse up and down an inclined plane, placed at right angles to the river, and sloping from it. A rope is attached to the bullock, and goes over a roller: at the end of the rope is a leathern bucket, which descends to the water as the bullock goes up the plane, and rises again to the roller, when it discharges itself into a vessel coated with bitumen, as the animal descends the plane and arrives at the bottom of it.

The castle of Felujiah, on the left bank, (between Hit and Hillah,) is one hundred and forty miles from Hit, but not near the site of Perisaboras, as Captain Chesney assumes it to be. Here is a bridge of boats, one of which, in the centre, is kept moveable, for the sake of allowing a passage for craft going up or down. Felujiah is close to the old Isa canal, and was taken by Rauwolf for the site of Babylon; other old travellers used to place this famous city at Bagdad. Rauwolf speaks of the remains of a bridge near Felujiah, the arches of which were constructed of burnt bricks; though he says the river is half a mile (German?) wide, he is credulous enough to believe that these arches once

stretched across the river: they were evidently the remains of an aqueduct. Seventy miles below Felujiah is Musseib, where there is also a bridge of boats one hundred and sixty yards long. It contains a 'new and handsome castellated caravansara on the right bank.' Macdam, about half way between Felujiah and Musseib, on the left bank, is, according to Captain Chesney, only nineteen miles from Bagdad. As the position of Bagdad is known, the course of the Euphrates may be here brought a little nearer than in our maps. Felujiah also is stated at not more than twenty-four or twenty-six miles from Bagdad, which is less than the maps generally give. The river is deeper between Felujiah and Musseib, and continues so all the way to Hilla, where it grows narrower and still deeper; 'the bridge of Hilla is four hundred and fifty feet long, with eighteen feet depth of water in the lowest season.' Niebuhr gives it a breadth of about four hundred German feet, or Danish perhaps. 'The bridge is a floating one, with a moveable boat in the centre.'—(Captain Chesney.) About two thirds of Hilla is on the right bank; the population about ten thousand, which is very small compared with the ground which it occupies. 'The bazaars are good, and well supplied with meat, fish, rice, and even luxuries; the city is regularly governed, in general quiet, peaceable, and particularly well disposed towards strangers and Franks. Small vessels lie below the bridge usually; and the ancient round boat, formed of reeds or oziers, *coated* with bitumen, about ten feet in diameter, and worked with one paddle, is still to be seen plying in the neighbourhood of the town, just as it is described in Herodotus, and seems to be well adapted for ferrying across the strong current, without losing much distance.' The passage of Herodotus referred to is (i. 194) where he is speaking of the *Armenian* boats which carried down commodities to Babylon. They were of a circular form, but made of ribs of willow, covered with skins and stuffed with dry sedge, but no bitumen was used; they were worked by two men,* each with a paddle.

Below Hilla, we find nothing but a flat country, with the derivations or cuts from the river, still more numerous than above ancient Babylon. The Pallacopas, during the time of the ancient Babylonian culture, commencing above the town of Babylon, carried off, during the season of the rise, a great quantity of superfluous water into the flats west of Babylon. But there seems good reason for believing that part of the waters of the Euphrates once entered the Persian Gulf by the Khore Abdallah, as the dry bed of a stream is said to run parallel to the Shab el Arab and the Euphrates, as far at least as the neighbourhood of Kufa. Niebuhr (II. p. 223, Copenhagen edition) saw the dry bed of this canal, as

* Boats propelled by two men, each having a paddle, are used in the part of the river at the marshes of Lemlun.—(Captain Chesney.)

he calls it, at Old Basra. He considers its origin to be at Hit, from whence it ran to Kufa, and from Kufa past Old Basra (Zobeier) into the Gulf, by the Khore Abdallah. If this is really altogether artificial work, it is one of the greatest monuments of Babylonian civilization, and one which has seldom been surpassed. It well deserves a more minute examination. By means of this great channel, and the numerous cuts from the Euphrates, the country between Hit and Basra must once have been the most productive spot in the world; and nothing now is wanted but a settled government and a better population, to fill the arid plains of Chaldæa with fertility and happiness. But the present government of this wretched country can effect nothing; the impulse of civilization must come from a foreign force, as civilization always has come. The banks of the Pallacopas were planted with trees, and the lands around were fertilized with the waters of the river, till the Mohammedan dominion turned a fertile plain into a waste. The lion, the tiger, and the jackal abound in the deserts.—(Niebuhr.) The ground, in some parts along the lower course of the river, is strongly impregnated with salt.

The nature of the river and the adjacent country between Basra and Hilla are well described by Niebuhr, to whom we are indebted for the observations of latitude at Basra, Mansurié, Ardsje (the limits of tide water, and between one hundred and twelve and one hundred and twenty geographical miles from the Persian Gulf), Graim (the Grahim of Captain Chesney), Lemlun, Hilla, and some few other places. On these observations, and the map of Niebuhr, our present delineation of the river above Basra, and as far as Hilla, mainly rest. Captain Chesney has added numerous villages and names on both sides of the river, but no astronomical observations. Niebuhr's map, however, does not attempt more than to fix the position of the chief places (such as we have mentioned) and to connect them pretty nearly by straight lines.

Basra is in 30° 30′ N. lat., Hilla in 32° 28′, which gives a difference of 1° 58′ of latitude. The longitude of Basra is given at 47° 33′, and that of Hilla perhaps about 44° 10′, leaving a difference of 3° 23′ in longitude. The computed distance between the two places is given by Captain Chesney at three hundred and eighty-nine miles three-fifths. As, then, there appears to be no very long bend in the river between Basra and Hilla, if we except, perhaps, the elbow at Korna, it will appear that the course of the river must be exceedingly tortuous, as we know it in fact to be, and as it is represented in Major Rennell's map. The extensive swamps of Lemlun show the flatness of the country and the slowness of the river in this part. Between Ardsje and Semave, in the month of December, Niebuhr found so little water that the boat was often aground; this shallow part is below the Lemlun

marshes. Captain Chesney places the last impediment at Kalat Geran, where there is a narrow bank of pebbles across the river, with three and a half or four feet water at the low season: 'this is the last shallow spot in the Euphrates; which, during the rest of its course to the sea, is deep, wide, and perfectly free from obstructions.' Kalat Geran appears, from Captain Chesney, to be a little above Graim or Grahim; and therefore Niebuhr's statement and his, as will appear from comparing the maps, do not entirely agree as to this part of the river.

Between Hilla and Bir no position is fixed astronomically, though the sites of Hit, Annah, Der, Racca, and some other places, are determined by various routes with tolerable precision. The reader who wishes to examine the authorities for these positions may refer to Major Rennell's Geography of Western Asia.

We are enabled, by Captain Chesney's examination of this great river, to add something to our previous knowledge, and to obtain a more precise notion of its length measured along its windings. If to the 1143 miles between Basra and Bir we add 600 more, following the river to its source along the Morad, this will make 1743; nor do we think the calculation in excess. The distance from Basra to the Gulf will increase the whole to about 1800 miles, in round numbers.

IV.—*Physico-Geographical Essays.* Essay I.—*Observations on Lakes;* being an Attempt to explain the Laws of Nature regarding them, the causes of their formation and diminution, the different phenomena which they exhibit, &c. By Colonel J. R. Jackson. 4to. 88 pp. Bellizard and Co., St. Petersburgh; Bossange, London.

This work is the first of a Series of Essays on Physical Geography, promised by a member of the Royal Geographical Society residing at St. Petersburgh. A second, and in some degree supplementary communication, from the same quarter, ("On the Seiches of Lakes,") will be found in another part of this volume: and the following extract from the letter which accompanied that, proves that the author is indefatigable in prosecuting similar researches.

"The older inhabitants of St. Petersburgh observe now a remarkable change in the temperature of their climate,—the examples of excessive and long-continued cold being now of rare occurrence. This must, however, be understood relatively, for what is here deemed mild weather, would be regarded as most severe in England, and the river constantly freezes to a great thick-